Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCYD513	Electroanalytical methods	3	0	0	3

Course Objective

- Electroanalytical techniques offer a unique access to information on chemical, biochemical, and physical systems.
- The purpose of this course is to provide both the instrumental basis and the theoretical fundamentals of electrochemical techniques, commonly used in recent time, so that an interest can be develop among the students to easily apply these techniques for real-time applications.

Learning Outcomes

- This course is rigorous examination of theory and applications of electro-analytical methods. Students completing this course will be:
- Knowledgeable of the current electroanalytical techniques,
- Comprehend the factors that must be controlled to obtain reliable and reproducible data during their electroanalytical experiments,
- Capable of selecting the most appropriate electroanalytical technique for a specific analysis,
- Adept at evaluating the electrode reaction mechanism from data obtained from various electroanalytical techniques.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Polarographic methods, Dropping Mercury Electrode, Current-voltage relationship, Voltammetry: Cyclic voltammetry, linear sweep voltammetry, pulse voltammetry, stripping voltammetry.	20L	By the end of this session, the student should be able to: Use voltammetry for determination of vital signs. Identify fundamentals of Polarography as a subtype of voltammetry. Determine voltage/ current changes in a polarographic wave. Do quantitative analysis using polarography. Calibration curve method. Standard addition method. Describe experimental set up and applications of polarography. Determine advantages and limitations of polarography.
2	Potentiometric techniques. Theory of electro-gravimetric analysis, electrode reactions, overpotential, completeness of deposition, and electrolytic separation of metals by controlled potential electrolysis/electrodeposition. Rotating disc and ring disc electrodes, concepts and applications of AC impedance techniques. Spectro-electrochemistry	22L	In this topic, students will: Understand the concept of the various types of electrodes that can be used for measuring solution potentials. How to select the proper one for measuring a given analyte. The apparatus for making potentiometric measurements is described along with limitations and accuracies of potentiometric measurements. Understand the use and application of impedance spectroscopy.

TOTAL	**42**	

Text Books:

1. Electroanalytical Methods, F. Scholz, 2nd Edition, Springer, 2010.

Reference Books:

1. Fundamentals of analytical chemistry, Douglas Skoog, Donald West, F. Holler, Stanley Crouch, 9th Edition, Cengage Learning, 2013.